

## CLAIMS

- 1 1. A photonic crystal structure containing a microcavity structure that is doped with  
2 materials that exhibit electro-magnetic induced transparency (EIT) so as to increase the  
3 non-linear properties of said photonic crystal systems.
- 1 2. The microcavity structure of claim 1, wherein said materials are doped with one  
2 EIT atom.
- 1 3. The microcavity structure of claim 2, wherein said materials are doped using a  
2 scanning tunnel microscope related techniques.
- 1 4. The microcavity structure of claim 1, wherein said materials are doped with a  
2 plurality of EIT atoms.
- 1 5. The microcavity structure of claim 4, wherein said materials are doped using a  
2 scanning tunnel microscope.
- 1 6. The microcavity structure of claim 1, wherein said photonic crystal structure is a  
2 three dimensional photonic crystal structure.
- 1 7. The microcavity structure of claim 1, wherein said photonic crystal structure is a  
2 two dimensional photonic crystal structure.
- 1 8. The microcavity structure of claim 1, wherein said photonic crystal structure is a  
2 multi-layered structure of varying indices.

1 9. The microcavity structure of claim 8, wherein said multi-layered structure forms a  
2 multi-layered film.

1 10. A method of forming a microcavity structure comprising:  
2 providing a photonic crystal structure that includes a point defect region; and  
3 doping said photonic crystal with materials that exhibit electro-magnetic induced  
4 transparency (EIT) so as to increase the non-linear properties of said photonic crystal  
5 systems.

1 11. The method of claim 10, wherein said materials are doped with one EIT atom.

1 12. The method of claim 11, wherein said materials are doped using a scanning tunnel  
2 microscope related techniques.

1 13. The method of claim 10, wherein said materials are doped with a plurality of EIT  
2 atoms.

1 14. The method of claim 13, wherein said materials are doped using a scanning tunnel  
2 microscope related techniques.

1 15. The method of claim 10, wherein said photonic crystal structure is a three  
2 dimensional photonic crystal structure.

1 16. The method of claim 10, wherein said photonic crystal structure is a two  
2 dimensional photonic crystal structure.

1 17. The method of claim 10, wherein said photonic crystal structure is a multi-layered  
2 structure of varying indices.

1 18. The method of claim 17, wherein said multi-layered structure forms a multi-  
2 layered film.